

WHAT IS CLAIMED IS:

1. A method for optimizing a playing of an audio program, which includes a preferred audio signal and a remaining audio signal, for end users, which includes both hearing impaired and non-hearing impaired listeners, comprising the steps of:
- a) delivering to each of the end users as separate audio signals both the preferred audio signal and the remaining audio signal;
  - b) mixing the preferred audio signal and the remaining audio signal under control of an end user to create a ratio of a signal level of the preferred audio signal relative to a signal level of the remaining audio signal; and
  - c) establishing under control of the end user an allowed variation of the audio program about the user selected ratio created in step b).
2. The method according to claim 1, further comprising the step of:
- d) automatically adjusting either the signal level of the preferred audio signal or the remaining audio signal to maintain the user selected ratio within the user established allowed variation.
3. The method according to claim 1, further comprising the steps of:
- e) sensing an ambient noise signal level at an end user's environment; and
  - f) automatically adjusting a signal level of either the preferred audio signal or the remaining audio signal in response to the sensed ambient noise signal level.
4. The method according to claim 1, wherein the preferred audio signal comprises a voice signal.
5. The method according to claim 1, wherein the preferred audio signal comprises a non-voice signal.
6. The method according to claim 4, wherein the remaining audio signal comprises a background signal.

7. The method according to claim 1, further comprising the step of mixing under the control of the end user the preferred audio signal and the remaining audio signal to create a ratio of the preferred audio signal relative to the remaining audio signal than varies from at least approximately 0.1 to at least approximately 20.

8. The method according to claim 1, further comprising the step of mixing under the control of the end user the preferred audio signal and the remaining audio signal so that the user selects either only the preferred audio signal or only the remaining audio signal, and all values between these two extremes.

9. An apparatus for creating an audio program so an end user, which could be either a hearing impaired listener or a non-hearing impaired listener, optimizes a playing of the audio program to compensate for any potential hearing infirmities of the end user comprising:

a) a first microphone sensing a preferred audio signal to create an unfiltered, non-pre-emphasized preferred audio signal having a bandwidth defined by a source of the preferred signal;

b) a second microphone sensing a remaining audio signal to create an unfiltered, non-pre-emphasized remaining audio signal having a bandwidth defined by a source of the remaining audio signal;

c) a signal encoder coupled to the first and second microphones and encoding the preferred audio signal and the remaining audio signal separately to maintain the unfiltered, non-pre-emphasized preferred audio signal and the unfiltered, non-pre-emphasized remaining audio signal as sensed by the first and second microphones; and

d) a recording system coupled to the signal encoder and recording the encoded versions of the preferred audio signal and the remaining audio signal separately on a media so that upon playback of the media the end user [can control] controls an amount of the preferred audio signal relative to the remaining audio signal provided to an end user speaker system to include either only the preferred audio signal or only the remaining audio signal, and all values between these two extremes.

10. The apparatus according to claim 9, wherein the media includes one selected from the group consisting of film, cassette tape, compact disc, digital video disk (DVD), computer storage, Internet transmitted signals, flash ram, and video tape.

11. An apparatus for creating an audio program so an end user, which is either a hearing impaired listener or a non-hearing impaired listener, optimizes a playing of the audio program to compensate for any potential hearing infirmities of the end user, comprising:

a) a first microphone sensing a preferred audio signal to create an unfiltered, non-pre-emphasized preferred audio signal having a bandwidth defined by a source of the preferred audio signal;

b) a second microphone sensing a remaining audio signal to create an unfiltered, non-pre-emphasized remaining audio signal having a bandwidth defined by a source of the remaining audio signal;

c) a signal encoder coupled to the first and second microphones and encoding the preferred audio signal and the remaining audio signal separately to maintain the unfiltered, non-pre-emphasized preferred audio signal and the unfiltered, non-pre-emphasized remaining audio signal as sensed by the first and second microphones; and

d) a broadcasting system coupled to the signal encoder and broadcasting the encoded versions of the preferred audio signal and the remaining audio signal separately so that upon reception the end user controls an amount of the preferred audio signal relative to the remaining audio signal provided to an end user speaker system to include either only the preferred audio signal or only the remaining audio signal, and all values between these two extremes.

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18. An audio system for optimizing a playing of an audio program recorded on a media, which audio program includes a preferred audio signal and a remaining audio signal, for end users, which include both hearing impaired and non-hearing impaired listeners, comprising:

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- a) a playback device playing the media and outputting an encoded audio signal including both the preferred audio signal and the remaining audio signal;
- b) a decoder coupled to the receiver and decoding the encoded audio signal to recreate the preferred audio signal and the remaining audio signal;

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d) a second user adjustable amplifier coupled to the decoder and amplifying the remaining audio signal to a level specified by the user, said second user adjustable amplifier having a range of amplification from zero to a maximum value; and

19. The apparatus according to claim 18, wherein the media includes one  
15 selected from the group consisting of film, cassette tape, compact disc, digital video  
disk (DVD), computer storage, Internet transmitted signals, flash ram, and video  
tape.

20. An audio system for optimizing a playing of a broadcast audio program, which includes a preferred audio signal and a remaining audio signal, for end users, which includes both hearing impaired and non-hearing impaired listeners, comprising:

a) a receiver receiving an encoded audio signal being broadcast and including both the preferred audio signal and the remaining audio signal;

25           b) a decoder coupled to the receiver and decoding the encoded audio signal  
to recreate the preferred audio signal and the remaining audio signal;

c) a first user adjustable amplifier coupled to the decoder and amplifying the preferred audio signal to a level specified by the user, said first user adjustable amplifier having a range of amplification from zero to a maximum value;

30 d) a second user adjustable amplifier coupled to the decoder and amplifying the remaining audio signal to a level specified by the user, said second user

adjustable amplifier having a range of amplification from zero to a maximum value;  
and

- e) a summing amplifier coupled to outputs of the first and second user adjustable amplifiers and outputting a total audio signal for coupling to an end user speaker system, said summing amplifier outputting a signal including, under end user control, either only the preferred audio signal or only the remaining audio signal or all values between these two extremes.

21. The apparatus according to claim 20, further comprising a controller under control of the end user and establishing an allowed variation of the audio program about the user selected signal levels of the preferred audio signal and the remaining audio signal and automatically adjusting either the signal level of the preferred audio signal or the signal level of the remaining audio signal to maintain the signal levels within the user established allowed variation from the user selected signal levels of the preferred audio signal and the remaining audio signal.

22. An audio system for optimizing a playing of an audio program, which includes a voice signal and a background signal, for end users, which includes both hearing impaired and non-hearing impaired listeners, comprising:

- a) a voice recognizer receiving an audio signal representing the audio program, separating the voice signal from the background signal, outputting as a first output a mostly voice signal and outputting as a second output a mostly background signal;

- b) a first user adjustable amplifier coupled to the first output of the voice recognizer and amplifying the mostly voice signal to a level specified by the user, said first user adjustable amplifier having a range of amplification from zero to a maximum value;

- c) a second user adjustable amplifier coupled to the second output of the voice recognizer and amplifying the mostly background signal to a level specified by the user, said second user adjustable amplifier having a range of amplification from zero to a maximum value; and

d) a summing amplifier coupled to outputs of the first and second user adjustable amplifiers and outputting a total audio signal for coupling to an end user speaker system, said summing amplifier outputting a signal including, under end user control, either only the mostly voice signal or only the mostly background signal or all values between these two extremes.

23. The system according to claim 22, wherein the voice recognizer includes an analog-to-digital converter converting the incoming audio signal into a digital bit stream, which is processed by the voice recognizer to create a digital voice signal and a digital background signal, said voice recognizer further comprising a first digital-to-analog converter converting the digital voice signal to the mostly voice signal and a second digital-to-analog converter converting the digital background signal to the mostly background signal.

24. The system according to claim 22, wherein the voice recognizer is programmed for a specific frequency response matched to a particular end user's hearing, and the voice recognizer is programmed to select only those frequency bands whose amplitude is reduced in the particular end user's hearing as the mostly voice signal.

25. The system according to claim 24, wherein the particular end user's adjustment of the first adjustable amplifier results in an amplification of the frequency bands whose amplitude is reduced in the particular end user's hearing, which frequency bands were selected by the voice recognizer.

26. The method according to claim 1, further comprising the step of broadband equalizing the preferred and remaining audio signals separately under control of the end user.

27. The method according to claim 1, further comprising the step of automatically adjusting the signal levels of either the preferred audio signal or the

remaining audio signal in response to slow moving change in the remaining audio signal level and maintaining the user adjusted signal levels of the preferred audio signal and the remaining audio signal despite the presence of short term bursts of large amplitude artifacts in the remaining audio signal.

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34. An apparatus for playing an audio program, which includes a preferred audio signal (P), a right audio signal (RA), a left audio signal (LA), and a center audio signal (CA), to an end user, which includes either a hearing impaired listener or a non-hearing impaired listener, comprising:

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a) a first bandpass filter having an input receiving a first signal, which includes the left audio signal (LA) plus the center audio signal (CA) plus the

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preferred audio signal (P), said first bandpass filter filtering out the left audio signal (LA) and outputting as an output the center audio signal (CA) plus the preferred audio signal (P);

b) a second bandpass filter having an input receiving a second signal, which  
5 includes the right audio signal (RA) plus the center audio signal (CA), said second bandpass filter filtering out the right audio signal (RA) and outputting as an output the center audio signal (CA);

c) a first adder having a first input coupled to the outputs of the first  
bandpass filter, having a second input coupled to the output of the second bandpass  
10 filter, subtracting the output of the second bandpass filter from the output of the first bandpass filter and outputting as an output the preferred audio signal (P);

d) a second adder having a first input coupled to the output of the first adder,  
having a second input receiving the second signal, which includes the right audio  
signal (RA) plus the center audio signal (CA), adding the output of the first adder to  
15 the second signal, and outputting as an output a first stereo signal including the right audio signal (RA) plus the center audio signal (CA) plus the preferred audio signal (P);

e) an end user adjustable amplifier being coupled to the output of the first  
adder, amplifying a signal level of the preferred signal (P) in accordance with an end  
20 user adjustment, and outputting as an output an adjusted preferred audio signal;

f) a third adder having a first input coupled to the output of the end user  
adjustable amplifier, having a second input coupled to the output of the second  
adder, and outputting as an output a first end user adjusted audio signal, which  
includes the right audio signal (RA) plus the center audio signal (CA) plus the  
25 preferred audio signal (P) plus the adjusted preferred audio signal;

g) a fourth adder having a first input coupled to the output of the end user  
adjustable amplifier, having a second input coupled to the first signal, which  
includes the left audio signal (LA) plus the center audio signal (CA) plus the  
preferred audio signal (P), and outputting as an output a second end user adjusted  
30 audio signal, which includes the left audio signal (LA) plus the center audio signal (CA) plus the preferred audio signal (P) plus the adjusted preferred audio signal;

h) a first audio output selector having a first input coupled to the output of the fourth adder, having a second input coupled to the output of the third adder and upon end user selection outputting the first and second end user adjusted audio signals; and

- 5           i) a second audio output selector having a first input receiving the first signal, which includes the left audio signal (LA) plus the center audio signal (CA) plus the preferred audio signal (P), having a second input receiving the output of the second adder which includes the first stereo signal, being comprises of the right audio signal (RA) plus the center audio signal (CA) plus the preferred audio signal (P), and in  
10 response to an end user selection, outputting the first stereo signal and the first signal as two stereo signals.

35. An audio system for optimizing a playing of an audio program, which includes a preferred audio signal and a remaining audio signal, for end users, which  
15 includes both hearing impaired and non-hearing impaired listeners, comprising:

- a) a first user adjustable amplifier receiving the preferred audio signal and amplifying the preferred audio signal to a level specified by the user, said first user adjustable amplifier having a range of amplification from zero to a maximum value;
- b) a second user adjustable amplifier receiving the remaining audio signal  
20 and amplifying the remaining audio signal to a level specified by the user, said second user adjustable amplifier having a range of amplification from zero to a maximum value;
- c) a first user adjustable equalizer coupled to the first user adjustable amplifier and selectively amplifying or attenuating one or more user selected  
25 frequency bands of the preferred audio signal to a level selected by the user; and
- d) a second user adjustable equalizer coupled to the second user adjustable amplifier and selectively amplifying or attenuating one or more user selected frequency bands of the remaining audio signal to a level selected by the user; and
- e) a summing amplifier coupled to outputs of the first and second user  
30 adjustable equalizers and outputting a total audio signal for coupling to an end user speaker system, said summing amplifier outputting a signal including, under end

user control and having a frequency response set by the end user, either only the mostly voice signal or only the mostly background signal or all values between these two extremes.

*Sub A* 36. The system according to claim according to claim 35, further comprising:

a) a first soft clipping circuit receiving as an input the preferred audio signal, having an output coupled to the input of the first end user adjustable amplifier, and limiting an overall magnitude of the preferred audio signal when a level of the preferred audio signal exceeds a first predetermined value; and

b) a second soft clipping circuit receiving as an input the remaining audio signal, having an output coupled to the input of the second end user adjustable amplifier, and limiting an overall magnitude of the remaining audio signal when a level of the remaining audio signal exceeds a second predetermined value, the combination of the first and second soft clipping circuits thereby automatically maintaining a user selected ratio of preferred signal to remaining audio, even in the presence of transient changes in either the preferred audio signal or the remaining audio signal.

37. The system according to claim 36, wherein the first and second predetermined values in the first and second soft clipping circuits, respectively, are user definable values.

38. An audio system for optimizing a playing of an audio program, which includes a preferred audio signal and a remaining audio signal, for end users, which includes both hearing impaired and non-hearing impaired listeners, comprising:

a) a first end user adjustable amplifier receiving the preferred audio signal and amplifying the preferred audio signal to a level specified by the user, said first end user adjustable amplifier having a range of amplification from zero to a maximum value, and said first end user adjustable amplifier having as a control

output a gain selection value representing a numerical value of the gain selected by the end user of the first end user adjustable amplifier;

b) a second end user adjustable amplifier receiving the remaining audio signal and amplifying the remaining audio signal to a level specified by the user, said  
5 second end user adjustable amplifier having a range of amplification from zero to a maximum value, and said second end user adjustable amplifier having as a control output a gain selection value representing a numerical value of the gain selected by the end user of the second end user adjustable amplifier; and

c) a feedback corrector receiving as a first input the control output of the first  
10 end user adjustable amplifier, receiving as a second input the control output of the second end user adjustable amplifier, receiving as a third input the output of the first end user adjustable amplifier, receiving as a fourth input the output of the second end user adjustable amplifier, and modifying the output of the first end user adjustable amplifier and the output of the second end user adjustable amplifier so  
15 that the actual preferred audio signal to remaining audio signal (PSRA) ratio corresponds to the end user desired value of the preferred audio signal to remaining audio signal (PSRA) ratio.

39. The system according to claim 38, wherein the feedback corrector  
20 comprises:

a) a first divider receiving as a numerator input the control output of the first end user adjustable amplifier, receiving as a denominator input the control output of the second end user adjustable amplifier, and outputting the result of the numerator input divided by the denominator input, which represents the end user desired  
25 preferred audio signal to remaining audio signal (PSRA) ratio;

b) a first vector accumulator coupled to the output of the first end user adjustable amplifier, storing vector samples of the preferred audio signal;

c) a second vector accumulator coupled to the output of the second end user adjustable amplifier storing vector samples of the remaining audio signal;

d) a first peak level detector coupled to the output of the first vector accumulator, wherein the first peak detector calculates a transient amplitude of a  
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segment of the preferred audio signal represented by the vector samples in the first vector accumulator;

5 e) a second peak level detector coupled to the output of the second vector accumulator, wherein the first peak detector calculates a transient amplitude of a segment of the remaining audio signal represented by the vector samples in the second vector accumulator;

10 f) a second divider receiving as a numerator input the output of the first peak level detector representing the transient amplitude of the segment of the preferred audio signal represented by the vector samples in the first vector accumulator, receiving as a denominator input the output of the second peak detector representing the transient amplitude of the segment of the remaining audio signal represented by the vector samples in the second vector accumulator, and outputting the result of the numerator input divided by the denominator input representing an actual value of the preferred audio signal to the remaining audio signal (PSRA) ratio;

15 g) a third divider receiving as a numerator input the output of the first divider representing a desired value of the preferred audio signal to the remaining audio signal (PSRA) ratio, receiving as a denominator input the output of the second divider representing an actual value of the preferred audio signal to the remaining audio signal (PSRA) ratio, and outputting the result of the numerator input divided by the denominator input, which represents a difference between the desired and actual values of the preferred audio signal to the remaining audio signal (PSRA) ratio; and

20 h) a first multiplier receiving as a first input the preferred audio signal, receiving as a second input the output of the third divider, and multiplying the output of the third divider and the preferred audio signal and outputting the result, which is a corrected value of the user setting of the preferred audio signal to the remaining audio signal (PSRA) ratio.

30 40. The system according to claim 38, wherein the feedback corrector comprises:

- a) a first divider receiving as a numerator input the control output of the first end user adjustable amplifier, receiving as a denominator input the control output of the second end user adjustable amplifier, and outputting the result of the numerator input divided by the denominator input, which represents the end user desired preferred audio signal to remaining audio signal (PSRA) ratio;
- b) a first vector accumulator coupled to the output of the first end user adjustable amplifier, storing vector samples of the preferred audio signal;
- c) a second vector accumulator coupled to the output of the second end user adjustable amplifier storing vector samples of the remaining audio signal;
- d) a first peak level detector coupled to the output of the first vector accumulator, wherein the first peak detector calculates a transient amplitude of a segment of the preferred audio signal represented by the vector samples in the first vector accumulator;
- e) a second peak level detector coupled to the output of the second vector accumulator, wherein the first peak detector calculates a transient amplitude of a segment of the remaining audio signal represented by the vector samples in the second vector accumulator;
- f) a second divider receiving as a numerator input the output of the first peak level detector representing the transient amplitude of the segment of the preferred audio signal represented by the vector samples in the first vector accumulator, receiving as a denominator input the output of the second peak detector representing the transient amplitude of the segment of the remaining audio signal represented by the vector samples in the second vector accumulator, and outputting the result of the numerator input divided by the denominator input representing an actual value of the preferred audio signal to the remaining audio signal (PSRA) ratio;
- g) a third divider receiving as a numerator input the output of the first divider representing a desired value of the preferred audio signal to the remaining audio signal (PSRA) ratio, receiving as a denominator input the output of the second divider representing an actual value of the preferred audio signal to the remaining audio signal (PSRA) ratio, and outputting the result of the numerator input divided by the denominator input, which represents a difference between the desired and

actual values of the preferred audio signal to the remaining audio signal (PSRA) ratio;

h) a fourth divider having as a denominator input the output of the third divider, and dividing one by the output of the third divider; and

5 i) a multiplier receiving as a first input the remaining audio signal, receiving as a second input the output of the fourth divider and multiplying the output of the fourth divider and the remaining audio signal and outputting the result, which is the corrected value of the user setting of the preferred audio signal to the remaining audio signal (PSRA) ratio.

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41. The system according to claim 38, wherein the first and second vector accumulators include user selectable vector sizes.

42. An audio system for optimizing a playing of an audio program, which  
15 includes a preferred audio signal and a remaining audio signal, for end users, which includes both hearing impaired and non-hearing impaired listeners, comprising:

a) a plurality of user selectable frequency dependent amplification devices, each device establishing a preferred audio signal to remaining audio (PSRA) over a separate frequency band, and each of the plurality of user selectable frequency  
20 dependent amplification devices including:

(i) a first bandpass filter receiving the preferred audio signal and filtering out everything within the preferred audio signal except for a predetermined bandwidth of the preferred audio signal;

(ii) a second bandpass filter receiving the remaining audio signal and  
25 filtering out everything within the remaining audio signal except for a predetermined bandwidth of the remaining audio signal;

(iii) a first end user adjustable amplifier receiving the predetermined bandwidth of the preferred audio signal and amplifying the predetermined bandwidth of the preferred audio signal to a level specified by the user, said  
30 first end user adjustable amplifier having a range of amplification from zero to a maximum value, and said first end user adjustable amplifier having as a



control output a gain selection value representing a numerical value of the gain selected by the end user of the first end user adjustable amplifier;

(iv) a second end user adjustable amplifier receiving the predetermined bandwidth of the remaining audio signal and amplifying the predetermined bandwidth of the remaining audio signal to a level specified by the user, said second end user adjustable amplifier having a range of amplification from zero to a maximum value, and said second end user adjustable amplifier having as a control output a gain selection value representing a numerical value of the gain selected by the end user of the second end user adjustable amplifier; and

(v) a feedback corrector receiving as a first input the control output of the first end user adjustable amplifier, receiving as a second input the control output of the second end user adjustable amplifier, receiving as a third input the output of the first end user adjustable amplifier, receiving as a fourth input the output of the second end user adjustable amplifier, and modifying the output of the first end user adjustable amplifier and the output of the second end user adjustable amplifier so that the actual preferred audio signal to remaining audio signal (PSRA) ratio for the predetermined bandwidth corresponds to the end user desired value of the preferred audio signal to remaining audio signal (PSRA) ratio for the predetermined bandwidth; and  
b) a summing amplifier receiving the outputs of all of the plurality of user selectable frequency dependent amplification devices to create a total audio signal.

43. The system according to claim 42, wherein each of the feedback correctors comprises:

a) a first divider receiving as a numerator input the control output of the first end user adjustable amplifier, receiving as a denominator input the control output of the second end user adjustable amplifier, and outputting the result of the numerator input divided by the denominator input, which represents the end user desired preferred audio signal to remaining audio signal (PSRA) ratio;

b) a first vector accumulator coupled to the output of the first end user adjustable amplifier, storing vector samples of the preferred audio signal;

c) a second vector accumulator coupled to the output of the second end user adjustable amplifier storing vector samples of the remaining audio signal;

5 d) a first peak level detector coupled to the output of the first vector accumulator, wherein the first peak detector calculates a transient amplitude of a segment of the preferred audio signal represented by the vector samples in the first vector accumulator;

e) a second peak level detector coupled to the output of the second vector  
10 accumulator, wherein the first peak detector calculates a transient amplitude of a segment of the remaining audio signal represented by the vector samples in the second vector accumulator;

f) a second divider receiving as a numerator input the output of the first peak  
15 level detector representing the transient amplitude of the segment of the preferred audio signal represented by the vector samples in the first vector accumulator, receiving as a denominator input the output of the second peak detector representing the transient amplitude of the segment of the remaining audio signal represented by the vector samples in the second vector accumulator, and outputting the result of the numerator input divided by the denominator input representing an actual value of the  
20 preferred audio signal to the remaining audio signal (PSRA) ratio;

g) a third divider receiving as a numerator input the output of the first divider representing a desired value of the preferred audio signal to the remaining audio signal (PSRA) ratio, receiving as a denominator input the output of the second  
25 divider representing an actual value of the preferred audio signal to the remaining audio signal (PSRA) ratio, and outputting the result of the numerator input divided by the denominator input, which represents a difference between the desired and actual values of the preferred audio signal to the remaining audio signal (PSRA) ratio; and

h) a first multiplier receiving as a first input the preferred audio signal,  
30 receiving as a second input the output of the third divider, and multiplying the output of the third divider and the preferred audio signal and outputting the result, which is

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a corrected value of the user setting of the preferred audio signal to the remaining audio signal (PSRA) ratio.

44. The system according to claim 42, wherein each of the feedback  
5 correctors comprises:

- a) a first divider receiving as a numerator input the control output of the first end user adjustable amplifier, receiving as a denominator input the control output of the second end user adjustable amplifier, and outputting the result of the numerator input divided by the denominator input, which represents the end user desired  
10 preferred audio signal to remaining audio signal (PSRA) ratio;
- b) a first vector accumulator coupled to the output of the first end user adjustable amplifier, storing vector samples of the preferred audio signal;
- c) a second vector accumulator coupled to the output of the second end user adjustable amplifier storing vector samples of the remaining audio signal;
- 15 d) a first peak level detector coupled to the output of the first vector accumulator, wherein the first peak detector calculates a transient amplitude of a segment of the preferred audio signal represented by the vector samples in the first vector accumulator;
- e) a second peak level detector coupled to the output of the second vector  
20 accumulator, wherein the first peak detector calculates a transient amplitude of a segment of the remaining audio signal represented by the vector samples in the second vector accumulator;
- f) a second divider receiving as a numerator input the output of the first peak level detector representing the transient amplitude of the segment of the preferred  
25 audio signal represented by the vector samples in the first vector accumulator, receiving as a denominator input the output of the second peak detector representing the transient amplitude of the segment of the remaining audio signal represented by the vector samples in the second vector accumulator, and outputting the result of the numerator input divided by the denominator input representing an actual value of the  
30 preferred audio signal to the remaining audio signal (PSRA) ratio;

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g) a third divider receiving as a numerator input the output of the first divider representing a desired value of the preferred audio signal to the remaining audio signal (PSRA) ratio, receiving as a denominator input the output of the second divider representing an actual value of the preferred audio signal to the remaining audio signal (PSRA) ratio, and outputting the result of the numerator input divided by the denominator input, which represents a difference between the desired and actual values of the preferred audio signal to the remaining audio signal (PSRA) ratio;

h) a fourth divider having as a denominator input the output of the third divider, and dividing one by the output of the third divider; and

i) a multiplier receiving as a first input the remaining audio signal, receiving as a second input the output of the fourth divider and multiplying the output of the fourth divider and the remaining audio signal and outputting the result, which is the corrected value of the user setting of the preferred audio signal to the remaining audio signal (PSRA) ratio.

45. A method for providing an end user adjustability over an audio program including a preferred audio signal and a remaining audio signal, comprising the steps of:

a) adjusting under control of the end user an amplitude of the preferred audio signal and an amplitude of the remaining audio signal to establish a user desired preferred audio signal to remaining audio signal (PSRA) ratio; and

b) controlling under the control of the end user a dynamic amplitude range for the preferred audio signal within which an amplitude of the preferred audio signal fluctuates.

46. The method according to claim 45, further comprising the step of:

c) controlling under the control of the end user a dynamic amplitude range for the remaining audio signal within which an amplitude of the remaining audio signal can fluctuate independently of the control in step b).

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47. The method according to claim 46, further comprising the step of:

d) maintaining mean levels of the preferred audio and the remaining audio in accordance with the end user adjustment in step a).

5 48. A method for providing an end user adjustability over an audio program including a preferred audio signal and a remaining audio signal, comprising the steps of:

a) setting by an end user a preferred audio signal level to a remaining audio signal level (PSRA) ratio; and

10 b) automatically adjusting mean signal power levels of either the preferred audio signal or the remaining audio signal when the remaining audio exceeds the preferred audio signal.

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50. An apparatus for providing a listener capability for optimizing a playing of an audio program to compensate for hearing uniqueness of the listener, comprising:

- a) a decoder outputting a plurality of channels, at least one of which is a main audio signal, and another of which includes a preferred audio signal;
- b) a first end user adjustable amplifier being coupled to the decoder and receiving as an input the preferred audio signal;
- c) a second end user adjustable amplifier being coupled to the decoder and receiving as an input the main audio signal;
- d) a first adder being coupled to the outputs of the first and second end user adjustable amplifiers and outputting a user adjusted composite signal having a user defined preferred audio to remaining audio ratio (PSRA);
- e) a second adder coupled to the decoder and summing the plurality of channels to create a normal composite signal; and
- f) a user selectable switch coupled to the first and second adders and outputting under control of the user either the user adjusted composite signal or the normal composite signal.

51. (Cancelled)

52. A method for enhancing an ultimate listener's hearing of broadcast as well as recorded audio programs containing voice components and increasing the efficiency of said hearing, said program having a voice frequency band limited audio signal and a total audio signal, said method comprising the steps of:

separating the voice frequency band limited audio signal from the total audio signal of the said recorded or broadcast program,

controlling said voice frequency band limited signal of said separating step in a manner that permits the ultimate listener to adjust the voice frequency band limited signal for maximum intelligibility, and

controlling said total audio signal in a manner that permits the ultimate listener to adjust the total audio signal for maximum listening.

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